

What is claimed is:

[Claim 1] 1. A method of fabricating an image device, comprising the steps of:

forming a silicon-on-insulating layer over a substrate, the silicon-on-insulating layer having a first surface and a second surface in contact with the substrate;
forming an image sensing device layer over the first surface of the silicon-on-insulating layer;
disposing a first substrate over the image sensing device layer;
lifting off the first substrate, the image sensing device layer and the silicon-on-insulating layer from the substrate so as to expose the second surface of the silicon-on-insulating layer; and
forming an optical device array over the second surface of the silicon-on-insulating layer.

[Claim 2] 2. The method of claim 1, further comprising a step of disposing a second substrate over the optical device array.

[Claim 3] 3. The method of claim 1, further comprising a step of forming a spacer over the second surface of the silicon-on-insulating layer and a step of disposing a second substrate over the spacer after the step of forming the silicon-on-insulating layer over the substrate.

[Claim 4] 4. The method of claim 1, further comprising a step of removing the first substrate in order to expose the image sensing device layer after the step of forming the optical device array.

[Claim 5] 5. The method of claim 4, further comprising a step of electrically connecting the image sensing device layer to a printed circuit board after the step of removing the first substrate. .

[Claim 6] 6. The method of claim 5, wherein the step of electrically connecting the image sensing device layer to the printed circuit board comprises the steps of:

forming a re-distribution layer over the image sensing device layer; and electrically connecting the re-distribution layer to the printed circuit board.

[Claim 7] 7. The method of claim 6, wherein the step of electrically connecting the re-distribution layer to the printed circuit board comprises the steps of:

performing a bumping process to form a plurality of bumps over the re-distribution layer, wherein each bump is electrically connected to the re-distribution layer, respectively; and electrically connecting the bumps to the printed circuit board.

[Claim 8] 8. The method of claim 1, wherein a material of the first substrate and the second substrate comprises glass.

[Claim 9] 9. The method of claim 1, wherein the step of forming the optical device array over the second surface of the silicon-on-insulating layer comprises the steps of:

forming a plurality of color filters over the second surface of the silicon-on-insulating layer; and

forming a plurality of condenser, wherein each condenser is disposed over one of the color filters.

[Claim 10] 10. The method of claim 9, wherein the condensers comprise a plurality of micro-lenses.

[Claim 11] 11. The method of claim 1, wherein the step of forming the image sensing device layer comprises the steps of:

forming an active layer over the first surface of the silicon-on-insulating layer, wherein the active layer comprises at least one sensing device therein;
forming an interconnection layer over the active layer, wherein the interconnection layer is electrically connected to the sensing device; and
forming a plurality of bonding pads over the interconnection layer, wherein each bonding pad is electrically connected to the interconnection layer.

[Claim 12] 12. The method of claim 11, wherein the sensing device comprises at least one photo diode.

[Claim 13] 13. The method of claim 1, further comprising a cutting process for forming a plurality of image sensor units after the step of forming the optical device array.

[Claim 14] 14. An image sensor, comprising:

a silicon-on-insulating layer, having a first surface and a second surface;
an image sensing device layer, disposed over the first surface of the silicon-on-insulating layer;
an optical device array, disposed over the second surface of the silicon-on-insulating layer; and
a substrate, disposed above the second surface of the silicon-on-insulating layer, wherein the optical device array is located between the substrate and the silicon-on-insulating layer.

[Claim 15] 15. The image sensor of claim 14, wherein the image sensing device layer comprises:

an active layer, disposed over the first surface of the silicon-on-insulating layer;

an interconnection layer, disposed over the active layer; and
a plurality of bonding pads, disposed over the interconnection layer, wherein each bonding pad is electrically connected to the interconnection layer.

[Claim 16] 16. The image sensor of claim 15, wherein the active layer of the image sensing device layer comprises at least one sensing device.

[Claim 17] 17. The image sensor of claim 16, wherein the sensing device comprises at least one photo diode.

[Claim 18] 18. The image sensor of claim 14, wherein the optical device array comprises:

a plurality of color filters; and
a plurality of condensers, wherein each condenser is disposed over one of the color filters, respectively.

[Claim 19] 19. The image sensor of claim 18, wherein the condensers comprise a plurality of micro-lenses.

[Claim 20] 20. The image sensor of claim 14, further comprising a spacer disposed between the second surface of the silicon-on-insulating layer and the substrate in order to hold the substrate above the optical device array.

[Claim 21] 21. The image sensor of claim 14, further comprising a re-distribution layer disposed above the first surface of the silicon-on-insulating layer, wherein the re-distribution layer is disposed on the image sensing device layer and is electrically connected to the bonding pads.

[Claim 22] 22. The image sensor of claim 21, further comprising a plurality of bumps disposed over the re-distribution layer, wherein each bump is electrically connected to the re-distribution layer.